

**BOARD OF STATE CANVASSERS
APRIL 30, 2020**

AGENDA ITEM #4



ECO-01390 Change Summary Verity Relay COTS Modem Revision

Doc. 4005663

CONFIDENTIAL AND PROPRIETARY

<p>This document contains confidential and proprietary information belonging exclusively to Hart InterCivic, Inc. No confidential or proprietary information contained in this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means electronic, mechanical, photocopied, recorded, or otherwise without prior written permission of Hart InterCivic, Inc.</p> <p>Copyright © 2002-2020, Hart InterCivic, Inc.</p>	Hart InterCivic	
	Document Number:	Revision:
	4005663	A.00
	Document Name:	
	ECO-01390 Change Summary: Verity Relay Kit Modem Revision	
		Page 1 of 6

Change History

Version	Date	Author(s)	Description
A.00	02/27/2020	J. Bernal	Initial release.

Owners and List of Contacts

Name	Email	Phone	Role
Jim Canter	jcanter@hartic.com	512.252.6410	Chief Technology Officer
Dan Gately	dgately@hartic.com	512.252.6817	Director, SCM
Jared Bernal	jbernal@hartic.com	512.252.6462	Sr. Regulatory Compliance Engineer
Lynn Simpson	lsimpson@hartic.com	512.252.6637	Sr. Mechanical Engineer

Table of Contents

1	SUMMARY	4
2	REASON / JUSTIFICATION FOR CHANGE	4
3	DESCRIPTIONS OF CHANGES	4
3.1	Approved Manufacturer's List Change	4
4	DATA JUSTIFYING CHANGE	5
4.1	Safety.....	5
4.2	EMC.....	5
4.3	Datasheet	5
4.4	Functional QA Testing.....	5
5	JUSTIFICATION OF DE MINIMIS CHANGE STATUS.....	6
6	DE MINIMIS CHANGE DEFINITION	6

1 SUMMARY

The COTS 4G "Cellular Dongle" USB modem used in the Verity relay kit has been revised by the manufacturer, MultiTech. The metal shielding on the USB cable is now grounded (soldered) to the circuit board inside the modem enclosure to improve EMC performance. There are no changes to electronic components or drivers. The model number, MTD-MNA1, is being updated to add a "manufacturing flag" (suffix) of "-02".

MultiTech has also removed a passive clamp-on ferrite from the cable that was not needed with the properly grounded cable shield. This is a COTS revision only. No change to the Verity devices, neither hardware nor software, is required to support the revised modem.

2 REASON / JUSTIFICATION FOR CHANGE

The COTS Cellular Dongle USB modem used in the Verity relay kit, the MTD-MNA1, has been revised by the manufacturer to improve EMC performance. The manufacturer, MultiTech, will add a "-02" suffix to the model number to account for this revision, and will manufacture all MTD-MNA1 modems with this revision going forward.

3 DESCRIPTIONS OF CHANGES

This section describes the revision to the COTS Cellular Dongle from MultiTech.

Shielded USB cables have a conductive layer that surrounds, but is insulated from, the power and data wires. The shield functions to reduce the susceptibility and propagation of electrical noise. Best practice is to ground both ends of the shield to maximize effectiveness.

MultiTech has modified the MTD-MNA1 modem to solder the shield to the modem circuit board ground to fully ground the shielded cable. The other end of the cable is already grounded to the metal USB connector. There are no new electronic components and no driver changes. The model number, MTD-MNA1, is being updated to add a "manufacturing flag" (suffix) of "-02".

MultiTech has also removed a passive clamp-on ferrite from the USB that was not needed with the properly grounded cable shield.

No changes are made to the Verity system to support the COTS modem revision.

3.1 Approved Manufacturer's List Change

The modem is ordered under Hart p/n 1005248. 1005248 will be updated to revision B to add the orderable p/n *MTD-MNA1-02* to the Approved Manufacturer's List.

Manufacturer Name	Manufacturer Part Number	Mfg. Part Life Cycle Status	Notes
MultiTech Systems, Inc.	MTD-MNA1	Removed	
MultiTech Systems, Inc.	MTD-MNA1-2.0	Preferred	

Table 1 – AML for 1005248.

4 DATA JUSTIFYING CHANGE

4.1 Safety

The revised model MTD-MNA1-2.0 modem maintains the same safety certification under UL 60950-1. There are no changes, additions, or deletions of any safety critical components due to this change.

4.2 EMC

The MTD-MNA1 modem is an FCC Class B certified device. The change to solder the cable shield to the modem circuit board introduced on the *MTD-MNA1-2.0* revision is an EMC best practice to reduce the susceptibility and propagation of electrical noise. Having both sides of the cable shield grounded makes the cable "fully shielded," like a faraday cage. MultiTech has provided radiated emissions EMC testing data from a NVLAP certified testing laboratory to validate the change. The data shows that the MTD-MNA1-2.0 maintains FCC Class B certification with a substantial -7.3dB of margin from the specification limit. The data can be found in the following file:

4005663_Supporting_Documents.zip

4.3 Datasheet

Datasheets are provided for the MTD-MNA1 and for the MTD-MNA1-2.0. The datasheets show that specifications are identical.

Datasheets can be found in 4005663_Supporting_Documents.zip.

4.4 Functional QA Testing

Hart InterCivic's internal Quality Assurance team has completed thorough testing on the revised modem. Testing has ensured that the MTD-MNA1-2.0 is one-to-one compatible as a drop-in replacement for the MTD-MNA1.

The MTD-MNA1-2.0 was end-to-end regression tested with both Verizon and AT&T networks on Verity systems compatible with the Verity Scan with Relay device.

The MTD-MNA1-2.0 modem performed identically to the MTD-MNA1 model in regression testing. The Verity systems were not modified from the certified releases to support the updated modem.

5 JUSTIFICATION OF DE MINIMIS CHANGE STATUS

- These changes do not materially alter the system's reliability.
- These changes do not materially alter the system's functionality.
- These changes do not materially alter the system's capability.
- These changes do not materially alter the system's operation.

6 DE MINIMIS CHANGE DEFINITION

From the United States Election Assistance Commission's Document titled: Voting System Testing & Certification Program Manual, Version 2.0.

3.4.2. De Minimis Change—Defined. A de minimis change is a change to a certified voting system's hardware, software, TDP, or data, the nature of which will not materially alter the system's reliability, functionality, capability, or operation.

End of Document

SLI Compliance Engineering Change Evaluation and Review Form

Vendor:	Hart InterCivic	Date:	23-Mar-20
Change ID:	ECO-01390	System(s):	Verity Voting 2.2, 2.2.1, 2.2.2, 2.4
Product:	Verity Relay COTS Modem Revision MTD-MNA1-02		

Change Summary Description

Summary: The COTS 4G "Cellular Dongle" USB modem used in the Verity relay kit has been revised by the manufacturer, MultiTech. The metal shielding on the USB cable is now grounded (soldered) to the circuit board inside the modem enclosure to improve EMC performance. There are no changes to electronic components or drivers. The model number, MTD-MNA1, is being updated to add a "manufacturing flag" (suffix) of "-02". MultiTech has also removed a passive clamp-on ferrite from the cable that was not needed with the properly grounded cable shield. This is a COTS revision only. No change to the Verity devices, neither hardware nor software, is required to support the revised modem.

Reason for Change: The COTS Cellular Dongle USB modem used in the Verity relay kit, the MTD-MNA1, has been revised by the manufacturer to improve EMC performance. The manufacturer, MultiTech, will add a "-02" suffix to the model number to account for this revision, and will manufacture all MTD-MNA1 modems with this revision going forward.

ECO Category: Revision

Change Evaluation		Comments
<input type="checkbox"/>	The change affects the form, fit or function of the equipment and therefore requires hardware testing to be performed. The testing requirements are defined in the Hardware Test Matrix table below. Any changes made to a system under test will result in the manufacturer supplying a list and detailed description of all changes.	
<input checked="" type="checkbox"/>	De Minimis change order: A de minimis change order is a change to a certified voting system's hardware, software, Technical Data Package (TDP), or data, the nature of which will not materially alter the system's reliability, functionality, capability, or operation.	The requested changes do not affect the system's reliability, functionality, capability, operation or software.
<input checked="" type="checkbox"/>	System documentation: The manufacturer has provided a description of how this change will impact any relevant system documentation and has provided the updated documentation, if applicable.	Updated Approved Manufacturer List will not go into effect until after the EAC ruling.
<input type="checkbox"/>	The change provides closure for an issue encountered during testing.	
<input type="checkbox"/>	Requires Evaluation from a EMC/EMI Test Lab	
<input type="checkbox"/>	Requires Evaluation from a NRTL Test Lab	Safety Evaluation


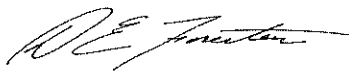
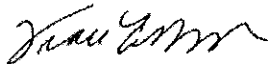


Summary Comments

Hart's ECO-01390 revised MTD-MNA1-2.0 modem has the identical regulatory compliance certification, FCC Class B, safety certification UL 60950-1, and environmental operating conditions as its predecessor the MTD-MNA1. No change to the Verity devices, neither hardware nor software, is required to support the revised modem.

SLI has assessed the hardware change in ECO 01390, including supporting documentation. The requested change does not affect the system's reliability, functionality, capability, operation or software. SLI considers the nature of this change to be De Minimis and therefore not to affect the Verity Voting 2.2, 2.2.1, 2.2.2, and 2.4 Federal certification status. Hart's QA regression testing was based on the evaluation and risk analysis of the modification to the modem on supported Verity systems. The testing that has been performed, including EMC testing, is adequate and no additional testing is required.

As required under section 3.4.3 of the EAC's Voting System Testing and Certification Program Manual Version 2.0, Hart InterCivic has provided the necessary information to verify the ECO 01390 change is De Minimis.

	Approved by/Title	Signature:	Date:
	Darrick Forester Hardware Test Engineer		23-Mar-20
	Traci Mapps Director		23-Mar-20





4720 INDEPENDENCE ST • WHEAT RIDGE, COLORADO 80033 • 844-754-8683 • 303-422-1566

slicompliance.com SLI Compliance, a Division of GLI®

March 23, 2020

U.S. Election Assistance Commission
1335 East West Highway, Ste. 4300
Silver Spring, MD 20910

Re: ECO 01390 Verity Relay COTS Modem Revision – MTD MNA1-2.0

Dear Mr. Lovato

At the request of Hart InterCivic, SLI is providing an assessment of ECO-01390, including supporting documentation provided by Hart InterCivic, to determine if this change is De Minimis, and no additional testing is required.

Summary Description:

The COTS 4G "Cellular Dongle" USB modem used in the Verity relay kit has been revised by the manufacturer, MultiTech. The metal shielding on the USB cable is now grounded (soldered) to the circuit board inside the modem enclosure to improve EMC performance. There are no changes to electronic components or drivers. The model number, MTD-MNA1, is being updated to add a "manufacturing flag" (suffix) of "-02". MultiTech has also removed a passive clamp-on ferrite from the cable that was not needed with the properly grounded cable shield. This is a COTS revision only.

Reference Documents:

- EAC 2005 Voluntary Voting System Guidelines (VVSG) Volume II, Sec. 1 & 4
- EAC Voting System Testing and Certification Program Manual V. 2, Sec. 3.4 & 3.5
- NOC 12-01 COTS Computer Equivalency for de minimis Change

Documentation used in SLI's Assessment:

- ECO-01390 Summary -Verity Relay COTS Modem Revision 4005663 A00
- Approval Manufacturer's List: 1005248 Rev B AVL.pdf
- Datasheets: MultiTech QuickCarrier Series Datasheet (MTD-MNA1) / (MTD-MNA1-2.0).pdf
- EMC Test Data: MTD-MNA1-2.0 EMC Test Data.pdf
- Verity Scan with Relay MTD-MNA1-2.0 Modem Test Report 4005666 A00

Conclusion:

Hart's ECO-01390 revised MTD-MNA1-2.0 modem has the identical regulatory compliance certification, FCC Class B, safety certification UL 60950-1, and environmental operating conditions as its predecessor the MTD-MNA1. No change to the Verity devices, neither hardware nor software, is required to support the revised modem.

SLI has assessed the hardware change in ECO 01390, including supporting documentation. The requested change does not affect the system's reliability, functionality, capability, operation or software. SLI considers the nature of this change to be De Minimis and therefore not to affect the Verity Voting 2.2, 2.2.1, 2.2.2, and 2.4 Federal certification status. Hart's QA regression testing was based on the evaluation and risk analysis of the modification to the modem on supported Verity systems. The testing that has been performed, including EMC testing, is adequate and no additional testing is required.

As required under section 3.4.3 of the EAC's Voting System Testing and Certification Program Manual Version 2.0, Hart InterCivic has provided the necessary information to verify the ECO 01390 change is De Minimis.

If you have questions regarding this assessment, please contact Darrick Forester.

Sincerely,

A handwritten signature in black ink, appearing to read "Traci Mapps", with a stylized, cursive script.

Traci Mapps
Director



Verity Scan with Relay MTD-MNA1-2.0 Modem Test Report

CONFIDENTIAL AND PROPRIETARY

<p>This document contains confidential and proprietary information belonging exclusively to Hart InterCivic, Inc. No confidential or proprietary information contained in this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means electronic, mechanical, photocopied, recorded, or otherwise without prior written permission of Hart InterCivic, Inc.</p> <p>Copyright © 2002-2020, Hart InterCivic, Inc.</p>	Hart InterCivic	
	Document Number: 4005666	Revision: A.00
	Document Name: Verity Scan with Relay MTD-MNA1-2.0 Modem Test Report	
		Page 1 of 7

Change History

Version	Date	Author(s)	Description
A.00	03/18/2020	Hart InterCivic	Initial release.

Table of Contents

1	INTRODUCTION	4
2	TEST PLAN.....	4
2.1	Test Effort.....	4
2.2	Test Scope	4
2.3	Test Environment	4
2.4	Test Data.....	5
2.5	Test Execution Process	5
3	TEST RESULTS.....	6
3.1	End-to-end Regression testing	6
3.2	Other Modem Functionality Testing	7

1 INTRODUCTION

This document describes the test plan and provides the test results for the test effort executed for qualifying the COTS modem revision as described in *ECO-01390 Change Summary Verity Relay COTS Modem Revision, document 4005663*.

The COTS Cellular Dongle USB modem used in the Verity relay kit, the MTD-MNA1, has been revised by the manufacturer to improve EMC performance. The manufacturer, MultiTech, will add a "-02" suffix, called a manufacturing flag by MultiTech, to the model number to identify this revision, and will manufacture all MTD-MNA1 modems with this revision going forward.

Reference:

- ECO-01390 Summary -Verity Relay COTS Modem Revision 4005663 A00.pdf

2 TEST PLAN

2.1 Test Effort

The test plan was based on the evaluation and risk analysis of the modification to the modem. As the change is limited to a passive modem hardware revision only, the test effort considers that there is **no** change to:

- Verity software
- Verity hardware
- Verity firmware
- COTS Firmware
- COTS electronic components
- COTS drivers

The test plan was therefore limited to the following test objectives:

1. Verify the modem functions identically on supported Verity systems with no changes required.
2. Verify that there are no regression issues due to COTS modem revision.
3. Verify transmission with a scaled load in locations with known good and known poor cellular coverage.

2.2 Test Scope

Test scope was limited to the test objectives noted above. The following tests were included in this test effort:

- Build Acceptance Testing (BAT) for integration and regression. BATs are a complete set of end-to-end regression tests. These tests will utilize multiple elections and will use the test the main functionality of the individual applications and system. All BATs will utilize the transmission functionality using the MTD-MNA1-2.0 modem.
- Validate no change to GUI elements.
- Validate modem correctly goes into "airplane mode" during the election event.

2.3 Test Environment

- Test systems were setup in accordance to the customer environment both the Verity releases 2.2.2 and 2.4. Verity Scan devices were equipped with a Relay kit that included the MTD-MNA1-2.0 modem and was setup per the system preparation and deployment instructions noted in Verity documentation.
- All workstation applications within the Verity system were included in the test effort.

2.4 Test Data

- Both general and primary elections were selected for this test effort.
- Large elections such as those developed for internal testing of system limits were used.
- Ballots with and without write-ins were chosen.

2.5 Test Execution Process

The high-level test execution process followed was as follows:

Following describes the high-level test executing process

1. Create the election in Verity Data.
2. Print ballots, generate keys and vDrives in Verity Build.
3. Print ballots using Verity Print for integration testing purposes.
4. Manually mark the above ballots.
5. Mark and print ballots using Verity Touch Writer for integration testing purposes.
6. Scan all the printed ballots on Verity Scan equipped with the
7. Close polls and transmit vote records
8. Reopen polls, scan more ballots and repeat step 6, multiple times
9. For each transmission, write vDrives in Verity Relay (workstation).
10. Scan the ballots in Verity Central and write vDrives in Central for integration testing purposes
11. Read all vDrives in Verity Count to tabulate and generate reports
12. Verify accuracy in Count

3 TEST RESULTS

Test effort was completed successfully with no failures. Detailed test results are shown below.

3.1 End-to-end Regression testing

Build Acceptance Testing (BAT): End-to-end Integration and Regression testing				
Election Name	Configuration	Paper Size	Scan with Relay	Relay Workstation
OPE_Alphanumeric	DB 32 GB	8.5x17 & 8.5x11	388T Pass 1204 Pass	Pass
51279 election in Test Mode	DBC 32 GB SA	8.5x11	388T Pass 1204 Pass	Pass
OPE Alphanumeric	DBC	8.5x17	388T Pass 1204 Pass	Pass
OPE Image	DBC 32 GB SA	8.5x14	388T Pass 1204 Pass	Pass
Perf 2	DBCS 32 GB	8.5x20	388T Pass 1204 Pass	Pass
Pennsylvania Write Ins	DBC 64 GB, Count CS 64/32 GB	8.5x17	388T Pass 1204 Pass	Pass
OPE Alphanumeric	DBC 64 GB, Count CS 64 GB	8.5x14	388T Pass 1204 Pass	Pass
SampleNPP_CPE (UT2 Certs)	DB SA 64 GB , Count CS 64 GB	8.5x11	388T Pass 1204 Pass	Pass
SQL Injection	DB SA 64 GB , Count CS 32 GB	8.5x11	388T Pass 1204 Pass	Pass
OPE Alphanumeric	DBC 64 GB	8.5x17	388T Pass 1204 Pass	Pass
PA Limits	DBC 64 GB	8.5x17	388T Pass 1204 Pass	Pass
OC_GE	DB CS 32 GB, Count 32 GB CS,	8.5x20	388T Pass 1204 Pass	Pass
CPE_All_Contests	DB SA 64 GB , Count 32 GB CS,	8.5x17 11 x 17	388T Pass 1204 Pass	Pass
OPE Rotation	DBC 64 GB	8.5x11	388T Pass 1204 Pass	Pass
Contra Costa	DBC 64 GB	8.5x14	388T Pass 1204 Pass	Pass

3.2 Additional Validation Testing Performed

Modem - MTD-MNA1-2.0			
Environment:			
Device used:		Modem tested:	
Scan with Relay with 1204 tablet		MTD-MNA1 2.0 modem	
Scan with Relay with 388T tablet		MTD-MNA1 2.0 modem	
Test Summary:			
Test Executed	Result		Comment
	1204	388T	
Post report - Screen	Pass	Pass	Modem description reported correctly on the screen during POST. Report indicates "MTD-MNA1" modem.
Post report - paper	Pass	Pass	Modem description is printed correctly on the paper Post report. Report indicates "MTD-MNA1" modem.
Transmission test	Pass	Pass	Ping test to Internet URL and Receiving station
Transmission Settings screen - Signal Strength	Pass	Pass	Signal strength is accurately shown (bars)
Transmission Settings screen - description	Pass	Pass	Modem description is accurate
Hdrive	Pass	Pass	Add host file settings using USB drive
Modem goes into Airplane mode	Pass	Pass	During election, modem is off
Transmit data to Relay successfully	Pass	Pass	Transmit election data to Relay (see "Elections Tested" tab)
Transmit Test / Scaled Load / > 2 Bars	Pass	N/A	In location with known Good to Very Good cellular coverage, 100 iterations, +10 ballots each iteration. Environment: Verity 2.2.2, 1204 Tablet
Transmit Test / Scaled Load / <= 2 Bars	Pass	N/A	In location with known Poor to Weak cellular coverage, 100 iterations, +10 ballots each iteration. Environment: Verity 2.2.2, 1204 Tablet